

**REMARKS**

**Summary of Office Action**

As an initial matter, Applicants note with appreciation that the Examiner has indicated consideration of the Supplemental Information Disclosure Statement filed January 14, 2008 by returning a signed and initialed copy of the Form PTO-1449 submitted therein.

Applicants also note with appreciation that the objection to the drawings has been withdrawn.

The restriction and election of species requirements are made final and claims 133-136, 156-180 and 191-204 are withdrawn from consideration.

Claims 103-109, 112-118 and 137-144 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Kamo et al., US 2003/0059660 (hereafter "KAMO") in view of U.S. Patent No. 3,911,080 to Mehl et al. (hereafter "MEHL"), although the rejection relies exclusively on KAMO and "Witzko et al.", which is assumed to be U.S. Patent No. 5,856,246 to Witzko et al. (hereafter "WITZKO") cited in the previous Office Action.

Claims 110, 111, 120-124, 126-132, 146-148 and 150-155 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over KAMO in view of WITZKO and further in view of MEHL.

Claims 119 and 145 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over KAMO in view of WITZKO and further in view of Hayadashida et al., U.S. Patent No. 5,403,483 (hereafter "HAYADASHIDA").

Claims 125, 149, 181-184 and 187-190 and withdrawn claims 191-193 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over KAMO in view of WITZKO and MEHL and

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further in view of Troczynski et al., US 2002/0107133 (hereafter "TROCZYNSKI").

Claims 185 and 186 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over KAMO in view of WITZKO and MEHL and TROCZYNSKI and further in view of Abe et al., US Patent No. 4,529,793 (hereafter "ABE").

### **Response to Office Action**

Reconsideration and withdrawal of the objections and rejections of record are respectfully requested in view of the following remarks.

#### ***Response to Rejection under 35 U.S.C. § 103(a) over KAMO in View of MEHL (WITZKO)***

Claims 103-109, 112-118 and 137-144 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over KAMO in view of MEHL, although the rejection refers exclusively to KAMO and WITZKO. In view thereof it is assumed that the rejection was intended to be made over KAMO in view of WITZKO. A confirmation in this regard is respectfully requested.

The rejection alleges that KAMO teaches a fuel cell having vent holes on the outer container, which vent holes allow for the escape of gas formed during the operation of the fuel cell and further alleges that vent holes contain a porous gas/liquid separation membrane that is permeable to gas but impermeable to liquid and may be made of polytetrafluoroethylene. The rejection acknowledges that KAMO fails to teach a coating on the vent hole membrane of the fuel container of KAMO but essentially asserts that WITZKO teaches a thin film hydrophobic polymer membrane with a surface coating of the claimed type, wherefore it would allegedly have been obvious to one of ordinary skill

in the art to use the coating of WITZKO on the membrane of KAMO since the coating allegedly provides good chemical and mechanical stability and a permanent finish. The rejection further alleges, *inter alia*, that “it is disclosed in the instant specification that the membrane material of [KATO], polytetrafluoroethylene, would inherently have a surface energy of not more than 8 dynes/cm [sic]”. Middle of page 3 of present Office Action. The rejection further essentially alleges that the porosity and thickness of the membrane as recited in some of the rejected dependent claims are inherent in, or rendered obvious by the membrane of KATO.

This rejection is respectfully traversed. In particular, there is no apparent reason (motivation) for one of ordinary skill in the art for applying a coating on the air vent hole membrane of the fuel container of KAMO. The material used for the membrane, i.e., polytetrafluoroethylene (PTFE), is known to be able to withstand prolonged contact with many chemicals, which is one of the reasons why PTFE is frequently used for contact with aggressive/corrosive environments.

Further, the chemicals which are contained in the fuel container of KAMO, i.e., water and methanol, are by no means aggressive and/or corrosive chemicals which can reasonably be expected to chemically attack the PTFE membrane of KAMO, and neither does KAMO contain any teaching or suggestion to the effect that it would be desirable to protect the PTFE membrane from the “attack” by water and methanol. In this regard, it is further noted that the fuel of KAMO consists predominantly of water. For example, according to paragraph [0104] of KAMO, the fuel container was filled with a 10 % by weight aqueous methanol solution. A corresponding solution would likely be harmless to any material, be it a polymer or an inorganic material, which is suitable for making a membrane, i.e., not just to PTFE.

Regarding WITZKO, it is noted that this document states in col. 3, lines 4-51 and col. 4, lines 23-31 (emphases added):

Uses of the claimed modification to coat fibers or textile materials and to form membranes are also provided. These modified membranes and textiles may be used primarily in the microfiltration area (such as in the protection of electronic parts from penetration by oil and water) and in the fabrics area.

A porous membrane can be treated, especially on its entire surface, with a polycation and/or a cationically modified synthetic resin in order to create a positive excess charge, (i.e., a positive zeta-potential). Total surface is understood here to mean not only the outer surface, but also the interstitial areas (i.e., the pores of the membrane). Complex formation with long-chain ionic surfactants or alkyl-substituted polyanions is possible. The entire modified membrane, especially a microporous membrane, is then characterized by the fact that it is hydrophobic during charge equilibrium of the components and also oleophobic when perfluorinated ionic compounds are used.

The advantages of this treatment lie in the simplicity of its preparation, for example, only aqueous or aqueous-alcoholic starting solutions that are free of additional organic solvents are required, as well as the good washing permanence of the treated polymer surface, the limited amounts of treating chemicals employed and the application opportunities for many polymer substrates. Moreover, halogen-free permanent hydrophobic treatment may be obtained without addition of any toxic compounds.

The treatment according to the invention consists of a polycation and/or cationic synthetic resin that coats in limited concentration the polymer substrate surface, the surface of which for the most part exhibits a negative zeta potential, and imparts to the substrate surface a positive zeta potential. The second component of the treatment, which is essentially responsible for improvement of the hydrophobic and oleophobic properties, is a long-chain (anionic) surfactant, preferably a fluorinated surfactant or a polyanion with aliphatic or aliphatic/aromatic side chains.

The modification according to the invention is therefore designed so that a hydrophilic polycation and/or polycationic functionalized synthetic resin is situated on the polymer surface of the substrate and adsorptive forces (physical or electrostatic adsorption) create the bond between the substrate and the polycation. The polycation film has excess charge that imparts a positive zeta potential to the treated substrate and allows it to react with additional components. This reaction capability is utilized for complex formation with dissolved long-chain surfactants or polyanions in the subsequent step.

The modification according to the invention can be used for a number of polymer substrates with negative zeta potential. These include fibers, flat textile articles and also membrane materials. These fibers or textile flat products include both synthetic and natural polymer starting materials. The natural starting materials include, in particular, cellulose, cotton, wool or silk. Mixtures of synthetic and natural polymer starting materials can also be used. Detachment of layers is reduced to a minimum as a result of the complex stability.

It is not seen that the above statements, while referring, *inter alia*, to membranes, are able to provide a motivation for one of ordinary skill in the art to coat the (polytetrafluoroethylene) air vent hole membrane of KAMO, let alone with the material taught by WITZKO.

In this regard, it is emphasized that the coating process of WITZKO requires the application onto the membrane or any other material of a “polycation and/or a cationically modified synthetic resin in order to create a positive excess charge, (i.e., a positive zeta-potential)”. Examples of corresponding materials are those employed in the Examples of WITZKO, i.e., polyallylamine hydrochloride and polyethyleneimine. Applicants are unable to see why the membrane of KAMO (which is intended to come into contact with materials such as aqueous methanol) would benefit from the application of a cationic material and/or from having a positive excess charge on the surface thereof, and neither does the present Office Action provide any explanation in this regard.

Applicants note that the rejection appears to rely on col. 2, lines 11-15 of WITZKO where it is stated:

There is a need for an improved permanent hydrophobic finish that can be produced using limited amounts for coating forming monolayers or limited multilayers having good chemical and mechanical stability even in the presence of aqueous or aqueous-alcoholic solutions.

Applicants respectfully submit that the above passage merely expresses that there is a need for a coating material which provides certain properties of the resultant coating. In other

words, the above passage does not imply that the monolayer of multilayer coating imparts good chemical and mechanical stability to the substrate to be coated, but merely states that the specific coating taught therein (i.e., a permanent hydrophobic finish ) itself should have “good chemical and mechanical stability even in the presence of aqueous or aqueous-alcoholic solutions”.

At any rate, even if one were to assume, *arguendo*, that one of ordinary skill in the art would assume that the coating of WITZKO provides a good chemical and mechanical stability to the coated substrate (in the presence of aqueous or aqueous-alcoholic solutions), it is pointed out that these properties are apparently inherent in the PTFE membrane of KAMO, wherefore a corresponding coating on the air vent hole membrane of KAMO would not provide any benefit, especially in view of the additional fact that the air vent hole membrane of KAMO is not seen to be subjected to any noteworthy chemical or mechanical stress.

It further is noted that the membrane for the air vent holes of KAMO is made of polytetrafluoroethylene (see, e.g., paragraph [0125]), i.e., a material which is known to have hydrophobic and oleophobic properties. Accordingly, there is no need to coat this membrane with a material that can impart these properties to the vent hole membrane of KAMO (even if one were to assume, *arguendo*, that these properties are of importance for a membrane that is intended to come into contact with merely water and methanol). In view thereof, it is not surprising that WITZKO fails to mention polytetrafluoroethylene as an example of a material which would benefit from providing it with the coating taught by WITZKO. The only mentioning of polytetrafluoroethylene in WITZKO appears to be in col. 5, lines 57-64, where it is noted that polytetrafluoroethylene *with (anionic) sulfonic and carboxylic acid groups in the side chain* is an

example of a preferred polyolefin membrane material that can be modified with the cationic coating described in WITZKO. Also, in the Examples of WITZKO the polymer materials which are provided with a coating are made from polyester, polyamide and cotton/polyester, i.e., materials which have nothing in common with (unmodified) polytetrafluoroethylene. This is yet another reason why KAMO in view of WITZKO is unable to render obvious the subject matter of any of the rejected claims.

With respect to the comments in the middle of page 3 of the present Office Action regarding claims 113, 114, 137-139 and 141, Applicants are unable to see where in paragraph [0052] or in any other place of US 2005/0158609 it is disclosed that “the membrane material of [KATO], polytetrafluoroethylene, would inherently have a surface energy of not more than 8 dynes/cm [*sic*]”. On the contrary, at the beginning of paragraph [0052] of US 2005/0158609 it is expressly stated that “[t]he lowest surface energy of commercially available Teflon membranes currently is about 18-20 dynes/cm at room temperature”, wherefore it may be desirable to coat a corresponding membrane with a material of a lower surface energy than that of the membrane.

Additionally, regarding the comments in the middle of page 4 of the present Office Action with respect to col. 2, lines 40-44 of WITZKO, Applicants submit that claim 115, for example, recites that the coating comprises a polymer with repeating units which comprise a fluorinated aliphatic group having at least about 5 fluorine atoms (see also claims 142, 176 and 190). In contrast, the (optionally fluorine containing) long chain surfactant of WITZKO which according to, e.g., col. 2, lines 19-24 of WITZKO may optionally be employed in combination with the water-soluble polycation and/or cationic synthetic resin described therein (i.e., the coating is not

“made of” this surfactant as incorrectly alleged at page 4 of the present Office Action) is a monomeric compound (perfluoro carboxylic acid or perfluorosulfonic acid), i.e., not a polymer.

For example, the fluorinated surfactants which are employed in some of the Examples of WITZKO (see, e.g., Table 5 in col. 9) are  $C_8F_{17}SO_2OH$  and  $C_7F_{15}COOH$ , i.e., perfluorinated monomeric compounds which do not have any unsaturated C-C bonds and would thus not be polymerizable by conventional methods. Further, WITZKO fails to teach or suggest (the use of) polymeric fluorinated surfactants. It further is pointed out that in the only Examples of WITZKO in which fluorine containing coatings are described, Examples 7 and 8, the coated materials are polyester and polyamide fabrics, i.e., materials which have nothing in common with (unmodified) polytetrafluoroethylene.

Applicants submit that for at least all of the foregoing reasons, KAMO in view of WITZKO fails to render it obvious to one of ordinary skill in the art to provide the air vent hole membranes of KAMO with a coating, let alone with a coating as taught by WITZKO. Accordingly, the rejection under 35 U.S.C. 103(a) over KAMO in view of WITZKO is without merit and should be withdrawn, which action is respectfully requested.

***Response to Additional Rejections under 35 U.S.C. § 103(a)***

Applicants note that all of the remaining rejections which are set forth in the present Office Action are based on a combination of KAMO and WITZKO and one or more additional documents. As set forth in detail above, KAMO in view of WITZKO fails to render it obvious to coat the air vent hole membrane of KATO. Further, none of MEHL, HAYADASHIDA, TROCZYNSKI and ABE is



able to cure this deficiency of KAMO and WITZKO (and neither does the Examiner allege this to be the case), wherefore all of the remaining rejections are necessarily without merit for this reason alone. In view of the foregoing, Applicants refrain from providing detailed comments with respect to any of the remaining allegations which are set forth in the present Office Action without admitting, however, that any of these allegations is meritorious.

Merely by way of example, with respect to TROCZYNSKI the Office Action essentially alleges that paragraph [0058] of this document renders it obvious to one of ordinary skill in the art to reinforce the air vent hole membrane of KAMO (provided with a cationic polymer coating according to WITZKO) with a stainless steel mesh in order to increase the strength of the membrane. In this regard, it is noted that the air vent hole membrane of KAMO does not appear to be subjected to any significant mechanical stress which would make it appear necessary or desirable to provide the membrane of KAMO with a corresponding reinforcement, and neither does KAMO contain any teaching or suggestion to the contrary in this regard.

Moreover, the stainless steel mesh supported membrane according to TROCZYNSKI is prepared by depositing a coating slurry of aluminum hydroxide powder and alpha alumina powder in distilled water on the stainless steel mesh by spray-coating. It is not seen that this teaching renders it obvious to one of ordinary skill in the art to reinforce a self-supporting (polymeric) material and in particular, the polytetrafluoroethylene membrane of KAMO with a stainless steel mesh.

Further, in the last two paragraphs of page 9 of the present Office Action it is alleged that ABE teaches a membrane substrate of polypropylene, which allegedly renders it obvious to one of ordinary skill in the art to replace the stainless steel membrane of TROCZYNSKI by polypropylene

to provide better corrosion resistance.

In this regard, it is pointed out that it is not seen that the air vent hole membrane of KAMO is intended to come into contact with materials which will corrode (even) stainless steel. In fact, the only specific materials that are mentioned in KAMO in this regard appear to be water and methanol.

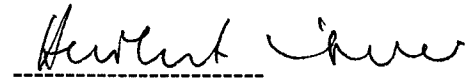
Further, it becomes clear from the whole disclosure of ABE that the membrane substrate of ABE is to serve as merely a temporary support for the membrane of ABE (i.e., during the preparation thereof). In particular, that the selective permeable membrane which comprises a specified polyquinazolone-based polymer taught by ABE is to be self-supporting becomes clear from, e.g., col. 9, lines 30-37 of ABE where it is stated, *inter alia*, that if the film (membrane) thickness is too small, the permeable membrane obtained is inferior in mechanical strength (which would not be a problem if a reinforcing material were to be present). Further, in Example 5 of ABE membranes are prepared by applying coating solutions on a glass plates (glass is one of the examples of materials which are mentioned in col. 9, lines 9-24 of ABE relied on by the Examiner). It is apparent that a glass plate cannot be used as permanent support for the selective permeable membrane taught by ABE. For at least all of the foregoing reasons, one of ordinary skill in the art would not be motivated by ABE to (permanently) reinforce the polytetrafluoroethylene air vent hole membrane of KAMO, let alone with any of the materials which are disclosed as temporary support for the membrane of ABE.

Applicants submit that for at least all of the reasons set forth above, the present rejections under 35 U.S.C. § 103(a) over KAMO in view of WITZKO, either alone or in combination with one or more of MEHL, HAYADASHIDA, TROCZYNSKI and ABE are unwarranted, wherefore withdrawal thereof is respectfully requested.

**CONCLUSION**

In view of the foregoing, it is believed that all of the claims in this application are in condition for allowance, which action is respectfully requested. If any issues yet remain which can be resolved by a telephone conference, the Examiner is respectfully invited to contact the undersigned at the telephone number below.

Respectfully submitted,  
Gennadi FINKELSHTAIN et al.

A handwritten signature in dark ink, appearing to read 'Neil F. Greenblum', is written over a horizontal dashed line.

Neil F. Greenblum  
Reg. No. 28,394

February 12, 2009  
GREENBLUM & BERNSTEIN, P.L.C.  
1950 Roland Clarke Place  
Reston, VA 20191  
(703) 716-1191

Heribert F. Muensterer  
Reg. No. 50,417